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THE SOURCES OF INSECTS FOUND IN STORED RAISINS

Prepared at Stored Product Insect Laboratory,^{1/}

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In the years before 1928, new-crop raisins delivered to storages from ranches were practically free from insect infestation. In the fall of 1928, cluster raisins were delivered infested by larvae of an insect that had not been seen before. These were larvae or worms of the raisin moth. In the years that immediately followed, infestation of new-crop raisins became general and it reached its peak in the fall of 1930. No infestations since have been so heavy, probably because of the activities of parasites. However, every crop of raisins delivered since the peak year has contained moderate or light populations of raisin moth larvae.

Briefly, this insect, like most others found in raisins, exists in four stages: Egg, larva, pupa, and adult. Eggs are laid on raisins drying on spread trays, on raisins in loosely made rolled paper trays, and on raisins on stacked wooden trays. The larvae that hatch from the eggs feed continuously and become full grown in about a month. Those that reach full size in the vineyards crawl into the soil or under the loose bark of grapevines, spin a thin cocoon, and live through the winter as larvae.

Larvae that are among raisins delivered to storage yards continue to feed until full grown and then crawl away in search of a dark place in which to pupate. Crawling reaches its height in November and early December and may be resumed on warm days even in winter. The larvae change to pupae in early spring and the adult moths emerge beginning in April.

There is only a small amount of breeding by the raisin moth in raisins of the previous year's crop stored in boxes in packers' storage yards. On ranches, however, the species keeps going on fallen mulberries, plums, peaches, figs, and other waste fruits until drying grapes are available again, in August.

The raisin moth is the only raisin insect that is brought in from ranches in large numbers. Other kinds are less important. Various species crawl into raisins on ranches seeking places for concealment and a few probably breed in them to a small extent.

^{1/} This laboratory is one of the field stations of the Agricultural Marketing Service, Marketing Research Division, Biological Sciences Branch, Stored-Product Insects Section, U.S. Department of Agriculture.

In storages, the chief offender is the saw-toothed grain beetle. This small, slender, brown beetle is always present, and in some years, when its numbers reach a peak, it is seen crawling everywhere. Breeding begins in April, reaches its maximum in June, and declines during the hottest weather. In old raisins it is always the dominant species. A few occur on farms, but there is always a resident population in storage yards. They crawl out of the stemmer and many probably find their way back to the stacks. Although they never have been known to fly, they get around rapidly by crawling.

The saw-toothed grain beetle may develop from egg to adult in 27 days or may take much longer. The adults sometimes live for 2 or 3 years. The species passes the winter in the adult stage.

The Indian-meal moth, a common pest in households and in warehouses, is fairly common in stored raisins, but never becomes as numerous as the raisin moth. The habits of these two species are similar, and the Indian-meal moth develops in about the same number of days as the raisin moth. There is evidence that saw-toothed grain beetles keep the Indian-meal moth population at rather low levels by eating the eggs of the moth.

Various other insects occur in stored raisins. These include the dried fruit beetle. This beetle is a strong flier and readily finds any pockets of wet raisins that give off fermentation odors. When raisins become moldy, fungus beetles feed upon the mold on them. Alcoholic fermentation in the stacks attracts lead cable borers in April, May and June.

Vinegar flies are attracted to cracked, crushed, and fermenting grapes, and their eggs and larvae may sometimes be found in the dried product. This type of infestation is most likely to occur in bleached raisins if there is delay between picking the grapes and dipping, spreading, and sulfuring them.

So-called carpet beetles that feed on wool, feathers, dead insects, and other materials of animal origin are found in storages to some extent, and it has been learned that they can eat raisins slightly but cannot develop on them. For the most part they are scavengers, cleaning up insect trash. Some species feed on grain and other vegetable materials. In the same class are the book lice or bark lice, which are very small, usually wingless insects. The flour beetles also are considered to be scavengers.

A considerable list of other species, mostly small, brown beetles, are found in raisins now and then. However, the passing of dirt-floored sheds, brought about by paving the storage areas to allow the use of lift trucks, is likely to do away with much of the mixed population that formerly flourished in the webbing, dead insects, and spilled raisins that accumulated around and under the foundation timbers.



